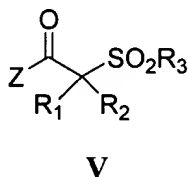


## APPENDIX

### AMENDMENTS TO THE CLAIMS

Please amend the claims as follows:

Claim 1 (currently amended): A method of preparing alpha-sulfonyl derivatives of the formula V:



wherein Z is H, OH, -NYOX, -OR<sub>5</sub> or -NR<sub>5</sub>R<sub>6</sub>;

X is hydrogen, alkyl of 1-6 carbon atoms, benzyl, hydroxyethyl, t-butyldimethylsilyl, trimethylsilyl or tetrahydropyranyl;

Y is hydrogen, alkyl of 1-6 carbon atoms, aryl of 6 to 10 carbon atoms, 5-10 membered heteroaryl having 1-3 heteroatoms selected from N, NR<sub>4</sub>, O and S, cycloalkyl of 3-6 carbon atoms, 5-10 membered cycloheteroalkyl; wherein said alkyl, aryl, heteroaryl, cycloalkyl and cycloheteroalkyl group of Y is optionally substituted on any atom capable of substitution, with 1 to 3 substituents selected from the group consisting of halogen, alkyl of 1-6 carbon atoms; alkenyl of 2-6 carbon atoms having from 1 to 3 double bonds; alkynyl of 2-6 carbon atoms having from 1 to 3 triple bonds, cycloalkyl of 3-6 carbon atoms, -OR<sub>5</sub>, =O, -CN, -COR<sub>5</sub>, perfluoroalkyl of 1-4 carbon atoms, -O-perfluoroalkyl of 1-4 carbon atoms, -CONR<sub>5</sub>R<sub>6</sub>, -S(O)<sub>n</sub>R<sub>5</sub>, -OPO(OR<sub>5</sub>)OR<sub>6</sub>, -PO(OR<sub>5</sub>)R<sub>6</sub>, -OC(O)OR<sub>5</sub>, -OR<sub>5</sub>NR<sub>5</sub>R<sub>6</sub>, -OC(O)NR<sub>5</sub>R<sub>6</sub>, -C(O)NR<sub>5</sub>OR<sub>6</sub>, -COOR<sub>5</sub>, -SO<sub>3</sub>H, -NR<sub>5</sub>R<sub>6</sub>, -N[(CH<sub>2</sub>)<sub>2</sub>]<sub>2</sub>NR<sub>5</sub>, -NR<sub>5</sub>COR<sub>6</sub>, -NR<sub>5</sub>COOR<sub>6</sub>, -SO<sub>2</sub>NR<sub>5</sub>R<sub>6</sub>, -NO<sub>2</sub>, -N(R<sub>5</sub>)SO<sub>2</sub>R<sub>6</sub>, -NR<sub>5</sub>CONR<sub>5</sub>R<sub>6</sub>, -NR<sub>5</sub>C(=NR<sub>6</sub>)NR<sub>5</sub>R<sub>6</sub>, -NR<sub>5</sub>C(=NR<sub>6</sub>)N(SO<sub>2</sub>R<sub>5</sub>)R<sub>6</sub>, -NR<sub>5</sub>C(=NR<sub>6</sub>)N(C=OR<sub>5</sub>)R<sub>6</sub>, -tetrazol-5-yl, -SO<sub>2</sub>NHCN, -SO<sub>2</sub>NHCONR<sub>5</sub>R<sub>6</sub>, phenyl, heteroaryl and 5-10 membered cycloheteroalkyl;

~~R<sub>1</sub> and R<sub>2</sub> are each, independently, aryl of 6 to 10 carbon atoms, 5-10 membered heteroaryl having 1-3 heteroatoms selected from N, NR<sub>4</sub>, O and S, 5-10 membered cycloheteroalkyl, or R<sub>+</sub>~~

and  $R_2$  taken together with the carbon atom to which they are attached form a 5-10 membered cycloheteroalkyl ring containing 1-3 heteroatoms selected from the group consisting of N,  $NR_4$ , O and S; and wherein the aryl, heteroaryl, or cycloheteroalkyl [[,]] may be optionally substituted on any atom capable of substitution with from 1 to 3 substituents selected from halogen, alkyl of 1-6 carbon atoms; alkenyl of 2-6 carbon atoms having from 1 to 3 double bonds; alkynyl of 2-6 carbon atoms having from 1 to 3 triple bonds, cycloalkyl of 3-6 carbon atoms,  $-OR_5$ ,  $=O$ ,  $-CN$ ,  $-COR_5$ , perfluoroalkyl of 1-4 carbon atoms,  $-O$ -perfluoroalkyl of 1-4 carbon atoms,  $-CONR_5R_6$ ,  $-S(O)_nR_5$ ,  $-OPO(OR_5)OR_6$ ,  $-PO(OR_5)R_6$ ,  $-OC(O)OR_5$ ,  $-OR_5NR_5R_6$ ,  $-OC(O)NR_5R_6$ ,  $-C(O)NR_5OR_6$ ,  $-COOR_5$ ,  $-SO_3H$ ,  $-NR_5R_6$ ,  $-N[(CH_2)_2]_2NR_5$ ,  $-NR_5COR_6$ ,  $-NR_5COOR_6$ ,  $SO_2NR_5R_6$ ,  $-NO_2$ ,  $-N(R_5)SO_2R_6$ ,  $-NR_5CONR_5R_6$ ,  $-NR_5C(=NR_6)NR_5R_6$ ,  $-NR_5C(=NR_6)N(SO_2R_5)R_6$ ,  $-NR_5C(=NR_6)N(C=OR_5)R_6$ ,  $-tetrazol-5-yl$ ,  $-SO_2NHCN$ ,  $-SO_2NHCONR_5R_6$ , phenyl, heteroaryl and 5-10 membered cycloheteroalkyl;

$R_3$  is alkyl of 1-18 carbon atoms, alkenyl of 2-18 carbon atoms having 1 to 3 double bonds, alkynyl of 2-18 carbon atoms having from 1 to 3 triple bonds, cycloalkyl of 3-6 carbon atoms, 5-10 membered cycloheteroalkyl, aryl of 6 to 10 carbon atoms, 5-6 membered heteroaryl having 1-3 heteroatoms selected from N,  $NR_4$ , O, and S; wherein said alkyl, alkenyl, alkynyl, cycloalkyl, cycloheteroalkyl, aryl and heteroaryl of  $R_3$  may optionally be substituted on any atom capable of substitution with from 1 to 3 substituents selected from halogen, alkyl of 1-6 carbon atoms; alkenyl of 2-6 carbon atoms having from 1 to 3 double bonds; alkynyl of 2-6 carbon atoms having from 1 to 3 triple bonds, cycloalkyl of 3-6 carbon atoms,  $-OR_5$ ,  $=O$ ,  $-CN$ ,  $-COR_5$ , perfluoroalkyl of 1-4 carbon atoms,  $-O$ -perfluoroalkyl of 1-4 carbon atoms,  $-CONR_5R_6$ ,  $-S(O)_nR_5$ ,  $-OPO(OR_5)OR_6$ ,  $-PO(OR_5)R_6$ ,  $-OC(O)OR_5$ ,  $-OR_5NR_5R_6$ ,  $-OC(O)NR_5R_6$ ,  $-C(O)NR_5OR_6$ ,  $-COOR_5$ ,  $-SO_3H$ ,  $-NR_5R_6$ ,  $-N[(CH_2)_2]_2NR_5$ ,  $-NR_5COR_6$ ,  $-NR_5COOR_6$ ,  $SO_2NR_5R_6$ ,  $-NO_2$ ,  $-N(R_5)SO_2R_6$ ,  $-NR_5CONR_5R_6$ ,  $-NR_5C(=NR_6)NR_5R_6$ ,  $-NR_5C(=NR_6)N(SO_2R_5)R_6$ ,  $-NR_5C(=NR_6)N(C=OR_5)R_6$ ,  $-tetrazol-5-yl$ ,  $-SO_2NHCN$ ,  $-SO_2NHCONR_5R_6$ , phenyl, heteroaryl and 5-10 membered cycloheteroalkyl;

R<sub>4</sub> is hydrogen; aryl; aralkyl, heteroaryl; heteroaralkyl, alkyl of 1-6 carbon atoms; cycloalkyl of 3-6 carbon atoms; -C(O)<sub>n</sub>R<sub>5</sub>, -CONR<sub>5</sub>R<sub>6</sub> or SO<sub>2</sub>R<sub>5</sub>;

R<sub>5</sub> and R<sub>6</sub> are each independently hydrogen, optionally substituted aryl; 4-8 membered heteroaryl having 1-3 heteroatoms selected from N, NR<sub>4</sub>, O and S; cycloalkyl of 3-6 carbon atoms; 5-10 membered cycloheteroalkyl; alkyl of 1-18 carbon atoms; alkenyl of 2-18 carbon atoms or alkynyl of 2-18 carbon atoms; or R<sub>5</sub> and R<sub>6</sub> taken together with the nitrogen atom to which they are attached may form a 5-10 membered cycloheteroalkyl ring; and

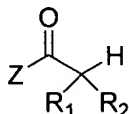
n is 1 or 2; or a pharmaceutical salt thereof,

which comprises reacting a sulfonyl fluoride of the formula III



III

wherein R<sub>3</sub>' is as hereinabove defined for R<sub>3</sub> with the proviso that R<sub>3</sub>' does not contain a group that can form an anion under basic conditions; with a carbonyl compound of the formula IV:

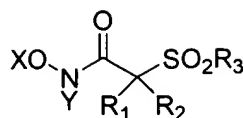


IV

wherein Z is H, OH, YNOX, -NR<sub>5</sub>R<sub>6</sub> or OR<sub>5</sub>, and X, Y, R<sub>1</sub>, R<sub>2</sub>, R<sub>5</sub>, and R<sub>6</sub> are as hereinabove defined; in the presence of a metal hydride or amide base in an ether organic solvent at temperatures from about -78°C to about 30°C to produce an alpha-sulfonyl carbonyl compound of formula V;

any reactive substituent group(s) being protected during the reaction and removed thereafter; and further if desired isolating any chiral or stereoisomeric product as an individual isomer.

Claim 2 (currently amended): ~~A~~ The method as claimed in claim 1 in which the compound of formula (V) prepared wherein Z is H, OH, -NR<sub>5</sub>R<sub>6</sub> or OR<sub>5</sub> is further reacted to convert it to an alpha-sulfonyl hydroxamic acid derivative of the formula I:



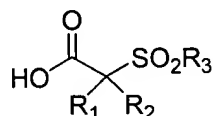
I

wherein X, Y, R<sub>1</sub>, R<sub>2</sub> and R<sub>3</sub> are as defined in claim 1 or a pharmaceutically acceptable salt thereof; any reactive substituent group(s) being protected during the reaction and removed thereafter; and further if desired isolating any chiral or stereoisomeric product as an individual isomer.

Claim 3 (currently amended): ~~A~~ The method as claimed in Claim 2 wherein Z in the compound of formula V prepared is:

(i) OR<sub>5</sub> wherein R<sub>5</sub> is other than hydrogen and the conversion to the alpha-sulfonyl hydroxamic acid derivative of the formula I is carried out by:

a) reacting the compound of formula V with an alkali metal hydroxide in the presence of water, and/or ether organic solvent or alcohol at temperatures ranging from about 0°C to about 100°C to produce a carboxylic acid of the formula VI:



VI

wherein, R<sub>1</sub>, R<sub>2</sub>, and R<sub>3</sub> are as hereinabove defined; and

(b) reacting the carboxylic acid of formula VI with a hydroxylamine or hydroxylamine derivative of the formula VII:



VII

wherein X and Y are as hereinabove defined; in the presence of suitable coupling reagent and polar organic solvent to produce a hydroxamate of the formula I

or

(ii) OH and the conversion to the alpha-sulfonyl hydroxamic acid derivative of the formula I is carried out according to step b) above.

Claim 4 (previously presented): The method of Claim 3 wherein the ether organic solvent in step a) is selected from the group consisting of tetrahydrofuran, diethylether and dioxane.

Claim 5 (previously presented): The method of Claim 3 wherein the alcohol in step a) is selected from the group consisting of methanol and ethanol.

Claim 6 (previously presented): The method of Claim 3 wherein the alkali metal hydroxide in step a) is selected from the group consisting of lithium hydroxide and sodium hydroxide.

Claim 7 (original): The method of Claim 3 wherein the polar organic solvent in step b) is dimethylformamide.

Claim 8 (previously presented): The method of Claim 3 wherein the coupling reagent is selected from the group consisting of 1-(3-dimethylaminopropyl)-3-ethylcarbodiimide hydrochloride, N-hydroxybenzotriazole, N-methylmorpholine, oxalylchloride and triethylamine.

Claim 9 (original): The method of Claim 3 wherein the coupling reaction is carried out at a temperature from about 0° C to 30° C.

Claim 10 (previously presented): The method of Claim 3 wherein the ether organic solvent used in the reaction between the compounds of formula III and IV is selected from the group consisting of tetrahydrofuran, diethylether and dioxane.

Claim 11 (previously presented): The method of Claim 3 wherein the metal hydride base or amide base used in the reaction between the compounds of formula III and IV and is selected from the group consisting of lithium diisopropylamine, lithiumhexamethyldisilazide, and sodium hydride.

Claim 12 (original): The method of Claim 1 wherein the sulfonyl fluoride of formula III is prepared by reacting a sulfonyl chloride of the formula II



II

wherein  $R_3'$  is as defined for  $R_3$  in claim 1 with the proviso that  $R_3'$  does not contain a group that can form an anion under basic conditions, with a fluorinating agent in the presence of a polar organic solvent from about 15°C to about 30°C.

Claim 13 (previously presented): The method of Claim 12 wherein the fluorinating agent is selected from the group consisting of potassium fluoride, potassium fluoride-calcium fluoride mixture and cesium fluoride.

Claim 14 (previously presented): The method of Claim 12 wherein the polar organic solvent is selected from the group consisting of acetonitrile and tetrahydrofuran.

Claims 15-28 (canceled).

Claim 29 (original): The method of Claim 1 wherein X is H or lower alkyl of 1-6 carbon atoms.

Claim 30 (original): The method of Claim 1 wherein Y is H.

Claim 31 (original): The method of Claim 1 where Z is OH or  $OR_5$  where  $R_5$  is  $C_1$ - $C_6$  alkyl.

Claim 32 (canceled).

Claim 33 (currently amended): The method of Claim 32\_1 wherein the cycloheteroalkyl ring is saturated.

Claim 34 (currently amended): The method of Claim 32\_1 wherein the cycloheteroalkyl ring has 6 atoms.

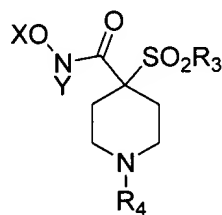
Claim 35 (currently amended): The method of Claim 32\_1 wherein the heteroatom is  $\text{NR}_4$  and  $\text{R}_4$  is hydrogen, trifluoromethylsulfonyl, optionally substituted aralkyl of 7-10 carbon atoms,  $(\text{C}_6\text{-C}_{10}\text{-aryl})\text{carbonyl-}$ , cycloheteroalkyl-carbonyl or heteroaryl-carbonyl.

Claim 36 (original): The method of Claim 1 wherein  $\text{R}_3$  is an optionally substituted  $\text{C}_6\text{-C}_{10}$  aryl group.

Claim 37 (original): The method of Claim 1 wherein  $\text{R}_3$  is a phenyl group substituted by one or more  $\text{OR}_5$  groups.

Claim 38 (original): The method of Claim 1 wherein  $\text{R}_5$  is  $\text{C}_1\text{-C}_6$  alkyl,  $\text{C}_2\text{-C}_6$  alkenyl,  $\text{C}_2\text{-C}_6$  alkynyl or halophenyl.

Claim 39 (previously presented): The method of Claim 1 in which the compound prepared is an alpha-sulfonyl hydroxamic acid derivative of the general formula IA:



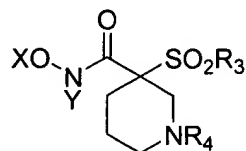
IA

wherein

X is hydrogen, or alkyl of 1-6 carbon atoms; and Y,  $\text{R}_3$  and  $\text{R}_4$  are as defined in Claim 1 or a pharmaceutically acceptable salt thereof.

Claims 40-44 (canceled).

Claim 45 (original): A compound of Formula IX



IX

wherein

X is hydrogen, or alkyl of 1-6 carbon atoms;

Y is hydrogen, alkyl of 1-6 carbon atoms, aryl of 6 to 10 carbon atoms, 5-10 membered heteroaryl having 1-3 heteroatoms selected from N, NR<sub>4</sub>, O and S, cycloalkyl of 3-6 carbon atoms, 5-10 membered cycloheteroalkyl; wherein said alkyl, aryl, heteroaryl, cycloalkyl and cycloheteroalkyl group of Y is optionally substituted on any atom capable of substitution, with 1 to 3 substituents selected from the group consisting of halogen, alkyl of 1-6 carbon atoms; alkenyl of 2-6 carbon atoms having from 1 to 3 double bonds; alkynyl of 2-6 carbon atoms having from 1 to 3 triple bonds, cycloalkyl of 3-6 carbon atoms, -OR<sub>5</sub>, =O, -CN, -COR<sub>5</sub>, perfluoroalkyl of 1-4 carbon atoms, -O-perfluoroalkyl of 1-4 carbon atoms, -CONR<sub>5</sub>R<sub>6</sub>, -S(O)<sub>n</sub>R<sub>5</sub>, -OPO(OR<sub>5</sub>)OR<sub>6</sub>, -PO(OR<sub>5</sub>)R<sub>6</sub>, -OC(O)OR<sub>5</sub>, -OR<sub>5</sub>NR<sub>5</sub>R<sub>6</sub>, -OC(O)NR<sub>5</sub>R<sub>6</sub>, -C(O)NR<sub>5</sub>OR<sub>6</sub>, -COOR<sub>5</sub>, -SO<sub>3</sub>H, -NR<sub>5</sub>R<sub>6</sub>, -N[(CH<sub>2</sub>)<sub>2</sub>]<sub>2</sub>NR<sub>5</sub>, -NR<sub>5</sub>COR<sub>6</sub>, -NR<sub>5</sub>COOR<sub>6</sub>, -SO<sub>2</sub>NR<sub>5</sub>R<sub>6</sub>, -NO<sub>2</sub>, -N(R<sub>5</sub>)SO<sub>2</sub>R<sub>6</sub>, -NR<sub>5</sub>CONR<sub>5</sub>R<sub>6</sub>, -NR<sub>5</sub>C(=NR<sub>6</sub>)NR<sub>5</sub>R<sub>6</sub>, -NR<sub>5</sub>C(=NR<sub>6</sub>)N(SO<sub>2</sub>R<sub>5</sub>)R<sub>6</sub>, -NR<sub>5</sub>C(=NR<sub>6</sub>)N(C=OR<sub>5</sub>)R<sub>6</sub>, -tetrazol-5-yl, -SO<sub>2</sub>NHCN, -SO<sub>2</sub>NHCONR<sub>5</sub>R<sub>6</sub>, phenyl, heteroaryl and 5-10 membered cycloheteroalkyl;

R<sub>3</sub> is alkyl of 1-18 carbon atoms, alkenyl of 2-18 carbon atoms having 1 to 3 double bonds, alkynyl of 2-18 carbon atoms having from 1 to 3 triple bonds, cycloalkyl of 3-6 carbon atoms, 5-10 membered cycloheteroalkyl, aryl of 6 to 10 carbon atoms, 5-6 membered heteroaryl having 1-3 heteroatoms selected from N, NR<sub>4</sub>, O, and S; wherein said alkyl, alkenyl, alkynyl, cycloalkyl, cycloheteroalkyl, aryl and heteroaryl of R<sub>3</sub> may optionally be substituted on any atom capable of substitution with from 1 to 3 substituents selected from halogen, alkyl of 1-6 carbon atoms; alkenyl of 2-6 carbon atoms having from 1 to 3 double bonds; alkynyl of 2-6 carbon atoms

having from 1 to 3 triple bonds, cycloalkyl of 3-6 carbon atoms,  $-OR_5$ ,  $=O$ ,  $-CN$ ,  $-COR_5$ , perfluoroalkyl of 1-4 carbon atoms,  $-O$ -perfluoroalkyl of 1-4 carbon atoms,  $-CONR_5R_6$ ,  $-S(O)_nR_5$ ,  $-OPO(OR_5)OR_6$ ,  $-PO(OR_5)R_6$ ,  $-OC(O)OR_5$ ,  $-OR_5NR_5R_6$ ,  $-OC(O)NR_5R_6$ ,  $-C(O)NR_5OR_6$ ,  $-COOR_5$ ,  $-SO_3H$ ,  $-NR_5R_6$ ,  $-N[(CH_2)_2]_2NR_5$ ,  $-NR_5COR_6$ ,  $-NR_5COOR_6$ ,  $SO_2NR_5R_6$ ,  $-NO_2$ ,  $-N(R_5)SO_2R_6$ ,  $-NR_5CONR_5R_6$ ,  $-NR_5C(=NR_6)NR_5R_6$ ,  $-NR_5C(=NR_6)N(SO_2R_5)R_6$ ,  $-NR_5C(=NR_6)N(C=OR_5)R_6$ ,  $-tetrazol-5-yl$ ,  $-SO_2NHCN$ ,  $-SO_2NHCONR_5R_6$ , phenyl, heteroaryl and 5-10 membered cycloheteroalkyl;

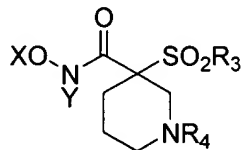
$R_4$  is hydrogen; aryl; aralkyl, heteroaryl; heteroaralkyl, alkyl of 1-6 carbon atoms; cycloalkyl of 3-6 carbon atoms;  $-C(O)_nR_5$ ,  $-CONR_5R_6$  or  $SO_2R_5$ ;

$R_5$  and  $R_6$  are each independently hydrogen, optionally substituted aryl; 4-8 membered heteroaryl having 1-3 heteroatoms selected from N,  $NR_4$ , O and S; cycloalkyl of 3-6 carbon atoms; 5-10 membered cycloheteroalkyl; alkyl of 1-18 carbon atoms; alkenyl of 2-18 carbon atoms or alkynyl of 2-18 carbon atoms; or  $R_5$  and  $R_6$  taken together with the nitrogen atom to which they are attached may form a 5-10 membered cycloheteroalkyl ring; and

$n$  is 1 or 2; or an optical isomer thereof or a pharmaceutically acceptable salt thereof.

Claim 46 (currently amended): ~~A~~ The compound according to Claim 45 which is 1-benzyl-3-(4-methoxy-benzenesulfonyl)piperidine-3-carboxylic acid hydroxamide.

Claim 47 (original): A pharmaceutical composition comprising a compound of Formula IX



IX

as defined in claim 45 or claim 46 or a pharmaceutically acceptable salt thereof;  
and a pharmaceutically acceptable carrier.

Claim 48 (original): A method of inhibiting pathological changes mediated by TNF-alpha converting enzymes (TACE) in a mammal in need thereof which comprises administering to said mammal a therapeutically effective amount of a compound of Claim 45, or a pharmaceutically acceptable salt thereof.

Claim 49 (original): The method of Claim 48 wherein the condition treated is rheumatoid arthritis, graft rejection, cachexia, inflammation, fever, insulin resistance, septic shock, congestive heart failure, inflammatory disease of the central nervous system, inflammatory bowel disease or HIV infection.

Claim 50 (original): A method of inhibiting pathological changes mediated by matrix metalloproteinases in a mammal in need thereof which comprises administering to said mammal a therapeutically effective amount of a compound of Claim 45, or a pharmaceutically acceptable salt thereof.

Claim 51 (previously presented): The method of Claim 50 wherein the condition treated is age related macular degeneration, diabetic retinopathy, proliferative vitreoretinopathy, retinopathy of prematurity, ocular inflammation, keratoconus, Sjogren's syndrome, myopia, ocular tumors, ocular angiogenesis/neovascularization or corneal graft rejection.

Claim 52 (original): The method of Claim 50 wherein the condition treated is atherosclerosis, atherosclerotic plaque formation, reduction of coronary thrombosis from atherosclerotic plaque rupture, restenosis, MMP-mediated osteopenias, inflammatory diseases of the central nervous system, skin aging, angiogenesis, tumor metastasis, tumor growth, osteoarthritis, rheumatoid arthritis, septic arthritis, corneal ulceration, abnormal wound healing, bone disease, proteinuria, aneurysmal aortic disease, degenerative cartilage loss following traumatic joint injury, demyelinating diseases of the nervous system, cirrhosis of the liver, glomerular disease of the

kidney, premature rupture of fetal membranes, inflammatory bowel disease, or periodontal disease.

Claim 53 (previously presented): The method according to claim 38 wherein R<sub>5</sub> is C<sub>1</sub>-C<sub>6</sub> alkyl substituted by C<sub>2</sub>-C<sub>6</sub> alkynyl.